CLOSING CORNERS IN THE PLSS

A Discussion of Acceptance or Rejection of these

Controlling Intermediate Monuments

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ABSTRACT

In late 2003 the MCDOT was facing questions from their GDACS consultants on the proper procedure and use of closing corners. In particular, questions as to when to say the found corners are acceptable or are still subject to adjustment had created controversy and confusion. MCDOT requested consulting on this and related subjects which resulted in a meeting and discussions with the GDACS consultants. This paper addresses the information shared at the meeting and explains an important alternate view of the acceptance of closing corners as well as precision issues one must address when discussing these corners.

HISTORICAL BACKGROUND

When the GLO encountered situations along senior lines where corners had to be offset in order to maintain rectangularity (and create as many aliquot parts as possible), their original solution was correct. Pay the surveyor to retrace the senior line, thus allowing the corner to be on the senior line. Even if it was found to be *slightly off* the senior line, it was then the senior line. This resulted in a situation where there were no junior/senior corners in the system. While the township line (in most cases) was still senior (based on date of survey), the corners were not subject to question, except for a major blunder. Thus, the concept of corners of minimum and maximum control did not exist. Further, the difference in the setting of closing 1/16th corners from non-closing 1/16ths was limited to the non-midpoint positions by parenthetical distances, with no concerns over using off-line points in the proportion.

The initial PLSS design and use did not have any closing corners. The closing corner was an adaptation by GLO in the early 1800's as a means of saving money. While boundary law, including the PLSS statutes and subsequent case law, are based on an ancient common law principle that states, "property corners do not move", the adoption of the closing corner was a serious violation of those principles. This is an important part of the story, as the confusion caused by closing corners is a direct result of the fact that they violate basic boundary law. Thus, we are plagued with situations caused by their existence.

The concept of a closing corner (hereinafter referred to as a CC) was simple; avoid paying the mileage rate on original surveys to a U.S. Deputy Surveyor. Rather than pay to retrace portions of senior lines, GLO simply instructed them to place it as close as possible. This of course, resulted in some relaxed attitudes as to how close it had to be. The best proof of what happened is found by examining the thousands of dependently resurveyed townships done since that time. It is obvious that while most Deputy Surveyors got the CC's within a few feet of the senior line, quite a few simply guessed, or were grossly in error as to where they actually were relative to the senior line.

The GLO solution recognized that an adjustment to the senior line would have to be made some day, but they were not paying for it in the original survey. As with any

"money saving idea" which violates basic principles, the CC soon began causing the GLO new headaches. Among the issues they had to address we find:

- How to set closing 1/16ths when the CC is off line
- How to set lost corners on the junior side when the CC is off line
- What to do with a lost CC, since the tie to a senior corner was usually not measured along the senior line, nor is there a proper return on which to base the proportion.
- How and when to adjust a CC
- When a CC is close enough to be called "on the senior line"
- When can a CC actually become part of the senior line?

It is in the midst of these questions that we find ourselves in this treatise.

WHAT DO YOU MEAN, OFF-LINE?

This discussion requires us to define "on" or "off the line". And that definition is perhaps a greater source of confusion than the CC itself. For it requires us to explore the application of both science and the law. And in our high-tech one part in a billion survey world, these two applications become very blurred.

Ignoring the CC for the moment, we must decide how close is close for any type of monumented corner. There are several schools of thought in this regard. Some are:

- Only a perfect "hit" is good
- Only if a monument is found to be within today's measurement standards is it good
- Anything is good
- Anything set to the standards existing at the time is good
- Anything set by proper legal procedure (regardless of standards) is good

In truth, all of these statements are correct, but not simultaneously. Every survey, every survey system, and every situation require a thorough review of the facts and the applicable law before knowing which of these approaches is acceptable. It is this very analysis that causes surveying to be a licensed and regulated profession. It is not a question of math, but a question of the law. To allow this to be a question of math will result in an ever-changing answer, based on the current measurement and adjustment tools and techniques.

Boundary surveying is not about the precision, and the PLSS was particularly set up to not worry about measurement anomalies. If the basic legal principle in boundary law is "corners never move", why then do so many feel they must move corners that do not fit the new current measurements? Therefore, the legal issues at stake must be confronted in order to answer this question.

Legally, when is "close" good enough? Let's examine a few possibilities:

1. Original PLSS corners, left undisturbed, are correct, regardless of measurement differences.
2. Measurement differences not possible to measure (they exist in math but do not exist on the ground) are irrelevant (0.001' for example)
3. Positions of monuments called for in deeds at specific bearings and distances hold over the measurements, if found undisturbed.
4. Positions of un-called-for monuments that fall within the significant figures and rounding of the original data are acceptable.
5. Positions which are monumented, called for by measurement, but are also subject to a senior right may only control direction of the line, but not the legal terminus of that line, regardless of compliance with measurement standards.

A brief discussion of each of these would help.

Item one is a matter of statute. Congress established this in the original 1785 act, as well as several subsequent acts. Further, the Courts have upheld this principle for over 200 years.

Item two may seem foolish, but is in fact at the very heart of some of our controversy. While using the *currently safe* thousandth of a foot as my example, I submit to you that 40 years ago that example could have been a larger number. Further, I would submit that 40 years from now, that number could even be reduced. The important point is this: Item two is a function of measurement technology, thereby constantly redefining the magnitude of the example. We should steer clear of this as our sole or main basis for acceptance or rejection of any evidence.

Item three is similar to item one, except that it is a function of centuries of common law and case law, as opposed to statute. It is the basis for boundary determination in every metes and bounds deed in the country. And it is not up to individual surveyors to decide when the seniority of calls is to be used or ignored in place of math or science issues. In fact, this principle goes out of its way to place measurements (metes) in a lower order than the bounds.

Item four addresses the un-called for monument (called an obliterated corner in the PLSS). It also forces us to recognize that even in our high-tech world, certain basic mathematical principles cannot be ignored, such as rounding and sigfigs. In reality, ignorance of this item is a major source of error by surveyors today. A 50 year old deed which calls for bearings to the nearest half-degree must be analyzed in that light. Similarly, a distance to the nearest link cannot be held to a pure conversion to feet at the current level of reporting (0.01' in most states). The record data simply does not support it, and to ignore sigfigs is to violate a far more important principle than some sort of closure limit.

Further, acceptance and rejection must also consider the measurement techniques that go beyond the sigfigs given in the record. The real question is: Should we reject a position set within standards at the time of setting, within the limitations of the typical equipment used at that time, but not within present standards? The answer is a very resounding "no". Again, to operate in any other way is to violate the principles of an established boundary system.

Finally, item five introduces the concept of a closing corner in a metes and bounds situation. CC's have existed therein for a long time, although not used in the PLSS until the early-1800's. The situation that creates a non-PLSS CC is as follows:

1. A senior line already exists in the record.
2. A land division is created on the junior parcel which utilizes the senior line as a bound.
3. A survey at the time (or even later, for that matter) places a monument at the bearing and distance called for in the deed (within sigfigs, as discussed above).
4. A subsequent retracement of the senior line discovers the monument to be in violation of the senior line.
5. The monument is still utilized to control the direction of the line, but the distance must give way due to the senior right. We see here the same use of this monument as one would use a CC.

To be certain, the entire problem with a CC is one of not allowing a junior corner to affect a senior line. But at what point would one have to say the "offline CC" is within it's intent? Bringing these 5 items together, unless we are willing to accept the constant moving of this property corner ad infinitum, we must at some point accept a not-so-perfect position. And the question then must be asked, "if it was set within whatever standards exist, must it forever be subject to review by future surveyors who operate under more stringent standards?" The law clearly says "no".

And in particular, if the senior line is subsequently retraced, and the CC is either said to be online, or is adjusted to be online, will it forever be subject to review of the profession? Barring a major blunder, is there some point where it must be said, this was set to a satisfactory standard, and will therefore be forever at this point.

A very pertinent example follows. In 1881 GLO sets a CC on a township line in northern Arizona. The tie to the nearest senior corner is 16.06 chains. Although returned as on the line, it in fact lies some 8 feet north of the senior line. BLM performed a dependent resurvey of the township line and the township to the south in 1948, and adjusts the CC to the line. The record data along the township line is reported to the nearest minute, with the closing distances shown to the link.

A surveyor in 2004 finds the senior corners and the adjusted CC to be 0.30 feet north of the senior line, as defined by the senior corners each side of the CC. The question now arises whether the 2004 surveyor should again adjust this CC.

A discussion of this example follows:

1. The distance from the ¼ corner to the south will still be within the sigfigs, since distances were to the nearest link, being rounded up or down from the nearest half link. Thus the position of the CC does not impact any subsequent uses along the senior line.
2. At one minute of bearing, the sigfigs computation for the alignment would involve the sine of half a minute multiplied by the 16.06 chains to see what would still be considered "on the line". Note that this computes to be 0.42 feet. Thus, given the significant figures (sigfigs), the point is on the line. Note that this assumes there is no other source of instrumentation error, which is not a true assumption. What standards and capabilities existed at the time of the resurvey are an even further extension of the 0.42 feet acceptance.
3. To think the CC needs to be adjusted again based on current measurement standards is irrelevant. The CC *IS* on the line by law and by math.
4. If the PLS were to reject this point as monumented by BLM, they would be in conflict with the BLM's claim to the federal lands north of the township line. In other words, are we to have two standards of acceptance and interpretation of the positional accuracy of every CC in the system?

BLM USE AND PROCEDURE

While I am in no way authorized to speak on behalf of BLM, I am very familiar with their reasoning and practice. BLM had to address these same issues. Even from a common sense point of view, they felt the farmer or rancher had a right to know in fact this property corner was not going to be moved every time a surveyor dropped by. It was the stability of the land lines themselves that was the goal, not an ever-increasing precision standard.

In most BLM offices, including Arizona in the 1980's, decisions were made to deal with the CC anomalies. People with a tremendous amount of experience and wisdom in the PLSS realized that the creation of the CC was illogical to begin with, and subsequent interpretations of the resolution of these anomalies were in need of finalization. That is, as measurement capabilities increased, a stop had to be made to this endless movement of the closing corner. Their solution was one based on a number of resources, including 5-35 of the Manual[1], IBLA decision 50 L.D. 402[2] , and an understanding of the role of the Manual itself.

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[1] 5-35 (3) discusses the other half of this argument, in that junior corners once retraced can be used to proportion lost senior corners. Note they cannot be used if not first adjusted to the line, or close enough to not impact the proportion. Similarly, once set on the line, they could control the alignment, as discussed in 5-35 (1).

[2] This case chastised BLM for not accepting private survey monuments that were within the standards BLM had at the time the private corner was set. Thus, measurement anomalies falling within equipment limitations, closure limits, and sigfigs were irrelevant and must be accepted. BLM could not adjust any points if set within standards at the time of setting.

The entire process of how to deal with a CC in the Manual is an administrative rule created to address the CC anomalies. The Manual itself is not "law". BLM decided that in the best interests of the landowners, surveyors, and themselves, enough was enough.

Thus, the BLM practice has become to accept a CC as part of the senior line, once it has been adjusted (or reset) in a resurvey. BLM however, did not limit the discussion to a question of rounding or sigfigs. That would leave the discussion based on math only, while ignoring the intent of the law. Their practice was more of practicality and the law. In reality, measurement capabilities could not produce results which truly allowed the rejection of a corner based on a few hundredths of a foot. And since the unit of measurement was the link, it was foolish to ever deal with corners less than that level of offset.

Barring a major blunder, the CC, once adjusted, would take on full status of the senior line. To be certain, this has resulted in thousands of CC's used as senior corners which in fact are not on a direct line between other senior corners. Some will argue that this is a violation of the senior rights of the landowners to the north. But again we must ask, at what point do the senior rights of landowners become bogged down in trivial measurement arguments and adjustments for bad ideas in the system?

On what basis do we make the senior rights arguments? It is on the law which established how the PLSS lines were to be laid down on the ground. Yes, the law "requires" the township line to be "straight"[3] and it's corners at 40 chain intervals. This same law requires the C1/4 to be at a bearing-bearing intersection, and quarter corners to be at midpoint and on line. When we get to the retracement of any PLSS project, we discover that the intent of that series of laws is *impossible* to meet, and that "close enough" is fine. Nowhere can we find the measurements to be perfect.

So why do we then accept this interpretation in the entire PLSS, but suddenly require it to be super-precise at an adjusted CC? The very senior corners upon which the CC is being judged are not on their straight line or at 40 chain intervals. There appears to be a serious inconsistency in our application and expectation of the law. And to require such greater precision on the most ludicrous type of corner in the system is error upon error.

While the BLM is certain to address this issue in the new Manual (due out in 2006), we cannot second guess their final solution. Suffice to say, the CC must become fixed at some point. It is only by our measurement arrogance that we require an ancient adjusted CC position to be adjusted again. Further, if a CC was lost, and a surveyor has re-established it by the proper procedures in 5-41 of the Manual, would we yet again require it to be adjusted because we find his definition of the line to be out of today's definition of the line?

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[3] This paper acknowledges but will not address the latitudinal curve issue.

CONCLUSION

The confluence of three arguments occurs at the closing corner:

1. Does an adjusted CC ever get to take on equal status with the senior line? Yes, both in the law and in practicality, as well as BLM practice for 2 decades.
2. Does the acceptance of any type corner rely on current measurement standards? No, those standards address your current measurement precision, and have nothing to do with the position of acceptable evidence.
3. Do our new measurement techniques allow us to ignore basic legal and scientific principles, including sigfigs, equipment limitations, and past standards of practice? No. To do so ignores the real principle of boundary law; boundaries are fixed once within the *intent* of the law. And the intent of the PLSS laws, case law, and even state statutory law take judicial notice of the imperfection of measurements.

At the risk of having double or triple standards on the acceptance of the same CC position, we cannot leave this to an "every surveyor for themselves" solution. It is strongly recommended the modern practitioner accept CC positions adjusted to the senior line as long as the position is within the standards, limitations, and law at the time of adjustment.